

PATENT ABSTRACTS OF JAPAN

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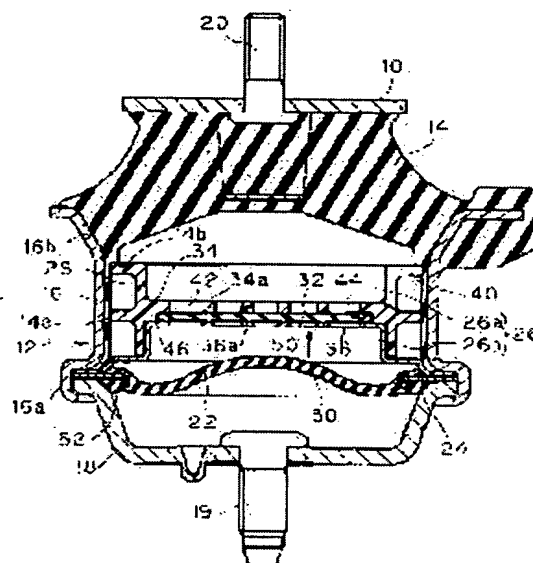
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(54) FLUID FILLING-IN VIBRATION-RESISTANT DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a vibration-resistant device improving dimensional accuracy of a movable gap for an elastic film in a partitioning member.
SOLUTION: In the vibration-resistant device, a first installing member 10 and second installing member 12 are combined together via a vibration-resistant base body 14, a fluid filling-in chamber 26 arranged between a diaphragm 22 and the vibration-resistant base body 14 is partitioned into two chambers by a partitioning member 30, and two chambers 26a and 26b are connected each other by an orifice 28. The partitioning member 30 is provided with an elastic film 32, and a first member 34 and a second member 36 restricting displacement of the elastic film. A recessed portion 44 housing the elastic film 32 is arranged on the first member 34, and a plane surface portion 36a connected with an end face 46 of an opening so as to block the opening of the recessed portion 44 is arranged on the second member 36. Thus, a gap 48 restricting the displacement of the elastic film 32 is formed between the first member 34 and second member 36.



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CLAIMS

[Claim(s)]

[Claim 1] The vibrationproofing base which consists of the 1st attachment member, the 2nd attachment member which has a tubed drum section, and rubber material which is interposed between these attachment members and combines both the attachment member, The diaphragm which was made to counter said vibrationproofing base and was attached in said 2nd attachment member, The fluid enclosure room prepared between the aforementioned vibrationproofing base and diaphragm in the inside of said 2nd attachment member, The batch member which forms the orifice passage which it is attached [passage] in the inner circumference of said 2nd attachment member, and said fluid enclosure room is divided [passage] into the 1st room by the side of a vibrationproofing base, and the 2nd room by the side of diaphragm, and makes the periphery section open the 1st room and the 2nd room for free passage, The elastic membrane into which a preparation and said batch member divide the 1st aforementioned room and the 2nd room, It comes to have the part I material allotted to the vibrationproofing base side about this elastic membrane, and the part II material which presses the periphery section of said part I material in the fluid enclosure room side periphery section of said vibrationproofing base by it being allotted to a diaphragm side about said elastic membrane, and caulking immobilization of the periphery section being carried out at said 2nd attachment member. While preparing the crevice for holding said elastic membrane in the aforementioned part I material or the part II material The fluid filled system vibration isolator characterized by what the flat-surface section which contacts an opening end face was prepared so that opening of this crevice might be plugged up on another side, and the clearance which restricts the variation rate of said elastic membrane between said part I material and part II material was formed for.

[Claim 2] The fluid filled system vibration isolator according to claim 1 characterized by forming the aforementioned part I material and the aforementioned part II material with a heterogeneous ingredient.

[Claim 3] The fluid filled system vibration isolator according to claim 2 characterized by having established said crevice in said part I material, having formed this part I material with resin, having prepared said flat-surface section in said part II material, and forming this part II material with a metal.

[Claim 4] The fluid filled system vibration isolator according to claim 1 to 3 characterized by positioning said part I material and part II material in a hand of cut by inserting in the hole which said part I material equips the periphery section with the wall which intercepts the flow to the hoop direction of said orifice passage, extended the tip of this wall, and prepared this extension in said part II material.

[Claim 5] The fluid filled system vibration isolator according to claim 4 characterized by having prepared the hook in the extension of said wall and hooking this hook on the opening edge of said hole.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the fluid filled system vibration isolator used for mainly supporting oscillating objects, such as an automobile engine, in vibrationproofing.

[0002]

[Description of the Prior Art] The 1st fixing metal with which a fluid filled system vibration isolator is generally attached in an oscillating generating object side, such as an engine, The 2nd tubed fixing metal by which attachment immobilization is carried out at the support side of a car-body frame etc. Join together through the vibrationproofing base which consists of rubber material, and counter with a vibrationproofing base and diaphragm is allotted to the lower part side of the 2nd fixing metal of the above. Make a room into a fluid enclosure room among between a vibrationproofing base and diaphragm, and this fluid enclosure room is divided into two by the side of a vibrationproofing base and diaphragm by the batch member. It is constituted so that it may make it come to be open for free passage of both ** with an orifice and a periodic-damping function may be achieved according to the liquid convection effect between both the liquid rooms by the orifice, or the vibration-deadening effectiveness of a vibrationproofing base.

[0003] In this fluid filled system vibration isolator, what was constituted from elastic membrane as valve portion material which carries out reciprocation displacement of the batch member, and a grid-like member of the vertical pair which restricts a motion of this elastic membrane is well-known. Under vibration of the large amplitude with a low frequency like vibration resulting from the irregularity of the road surface at the time of car transit, the vibration isolator with such elastic membrane demonstrates a periodic-damping function because a fluid flows for two rooms through an orifice. On the other hand, under vibration of tiny vibration width of face with a high frequency like vibration resulting from an engine rotational frequency, the above-mentioned orifice does not function but demonstrates a periodic-damping function according to reciprocation deformation of elastic membrane.

[0004] About this kind of vibration isolator, what constituted the grid from an orifice member of the vertical pair which forms orifice passage in the periphery section in preparation for a center section, and elastic membrane held between both orifice members as a batch member into which an up-and-down liquid room is divided is indicated by JP,6-221368,A. In this vibration isolator, fitting of the orifice member which consists of the same ingredient was carried out, in order to set up orifice passage and the movable clearance between elastic membrane and to raise fitting precision, the fitting side had to be cut or dimensional accuracy of the movable clearance between elastic membrane had to be sacrificed. That is, when having set up the clearance dimension at the time of combining, therefore combining the large components of especially manufacture tolerance by each dimension setup in the orifice member of the upper and lower sides which fit in in this case, it was not easy to secure the dimensional accuracy of a movable clearance.

[0005] This invention is made in view of the above point, and aims at improving the dimensional accuracy of the movable clearance for the elastic membrane in a batch member.

[0006]

[Means for Solving the Problem] The 2nd attachment member in which the fluid filled system vibration isolator of this invention has the 1st attachment member and a tubed drum section, The vibrationproofing base which consists of rubber material which is interposed between these attachment members and combines both the attachment member, The diaphragm which was made to counter said vibrationproofing base and was attached in said 2nd attachment member, The fluid enclosure room prepared between the aforementioned vibrationproofing base and diaphragm in the inside of said 2nd attachment member, The batch member which forms the orifice passage which it is attached [passage] in the inner circumference of said 2nd attachment member, and said fluid enclosure room is divided [passage] into the 1st room by the side of a vibrationproofing base, and the 2nd room by the side of diaphragm, and makes the periphery section open the 1st room and the 2nd room for free passage, The elastic membrane into which a preparation and said batch member divide the 1st aforementioned room and the 2nd room, It comes to have the part I material allotted to the vibrationproofing base side about this elastic membrane, and the part II material which presses the periphery section of said part I material in the fluid enclosure room side periphery section of said vibrationproofing base by it being allotted to a diaphragm side about said elastic membrane, and caulking immobilization of the periphery section being carried out at said 2nd attachment member. While preparing the crevice for holding said elastic membrane in the aforementioned part I material or the part II material, the flat-surface section which contacts an opening end face is prepared so that opening of this crevice may be plugged up on another side, and the clearance which restricts the variation rate of said elastic membrane between said part I material and part II material is formed.

[0007] The dimension is prescribed by the depth of the crevice which established the movable clearance for elastic membrane in the part I material or the part II material in the batch member which forms orifice passage in the periphery section as it is the vibration isolator of this invention, namely, the dimension which regulates the variation rate of elastic membrane -- the part I material or the part II material -- it can set up only by the side. Therefore, the dimensional accuracy of a movable clearance can be improved compared with the case where a dimension setup is carried out with both combination. Close dimensional accuracy is called for also about the movable clearance between elastic membrane by the advancement of the military requirement of the latest car, and if it is this invention, it can respond cheaply in simple combination to such a demand.

[0008] In the vibration isolator of this invention, the part I material and the part II material can be formed with a heterogeneous ingredient, and by establishing the above-mentioned crevice in the small member of manufacture tolerance in that case, while is accurate and they can set up a movable clearance only by the member.

[0009] For example, said crevice is established in said part I material, this part I material may be formed with resin, said flat-surface section may be prepared in said part II material, and this part II material may be formed with a metal. In this case, about the part II material which carries out caulking immobilization, the reinforcement which is equal to a caulking is securable by forming with metals, such as a press steel plate and an aluminum cast. On the other hand, the dimensional accuracy of a movable clearance can be secured about the part I material which performs a dimension setup of a movable clearance, without carrying out cutting by forming by resin with sufficient dimensional accuracy. Moreover, lightweight-ization can also be attained by forming by resin.

[0010] As for the part I material and the part II material, in the vibration isolator of this invention, constituting so that it may not contact

fundamentally is desirable by parts other than the contact section of the above-mentioned flat-surface section and a crevice opening end face. However, in order to position both in a hand of cut, the part may touch.

[0011] For example, when the part I material equips the periphery section with the wall which intercepts the flow to the hoop direction of said orifice passage, the tip of this wall may be extended and you may insert in the hole which prevents this extension in the periphery section of said part II material. In this case, the part I material and the part II material can be positioned in a hand of cut by applying an extension to the opening edge of the above-mentioned hole. Moreover, since the wall is extended to the part II material side in this case, leak of a fluid [**** / from between the tip of a wall and the part II material / un-] can also be prevented by this extension.

[0012] Moreover, a hook may be prepared in the extension of said wall, this hook may be hooked on the opening edge of said hole, and, thereby, omission prevention with the part I material and the part II material at the time of manufacture and rotation prevention are attained.

[0013]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to a drawing.

[0014] Drawing 1 is drawing of longitudinal section of the fluid filled system vibration isolator concerning 1 operation gestalt of this invention. This vibration isolator comes to join together the 1st fixing metal 10 attached in an oscillating generating object side, such as an engine, and the 2nd fixing metal 12 which has the tubed drum section by which attachment immobilization is carried out at the support side of a car-body frame etc. through the vibrationproofing base 14 which consists of rubber material.

[0015] The 2nd fixing metal 12 consists of tubed metallic ornaments 16 and bottom metallic ornaments 18 concluded by the lower limit 16a with the caulking means, and the bolt 19 for attachment protrudes on the bottom metallic ornaments 18.

[0016] The 1st fixing metal 10 is the plate-like part material which set necessary spacing to the axial center section upper part of the 2nd fixing metal 12, and was allotted to it, and the bolt 20 for attachment protrudes on the center section towards the upper part.

[0017] The 1st fixing metal 10 fixed [the appearance] the abbreviation truncated cone form with the vulcanization shaping means on nothing and its top face, and the upper limit section of the 2nd fixing metal 12 has fixed the vibrationproofing base 14 with the vulcanization shaping means in the lower limit periphery section. In the case of drawing, diameter expansion formation of the upper limit section 16b of the tubed metallic ornaments 16 is carried out at the shape of a taper, and vulcanization adhesion of the lower periphery of the vibrationproofing base 14 is carried out at this upper limit section 16b. Thin film rubber section 14a installed in the shape of a thin film from the vibrationproofing base 14 is prepared in the internal surface of the 2nd fixing metal 12.

[0018] The lower part side of the 2nd fixing metal 12 is equipped with the diaphragm 22 which consists of rubber membrane so that it may counter with the vibrationproofing base 14. Diaphragm 22 equips the periphery section with the ring-like reinforcement metallic ornaments 24, and it is attached in the 2nd fixing metal 12 by these reinforcement metallic ornaments 24 making it go away with the tubed metallic ornaments 16 and the bottom metallic ornaments 18, and caulking immobilization being carried out at the section.

[0019] Inside the 2nd fixing metal 12, the fluid enclosure room 26 sealed between diaphragm 22 and the vibrationproofing base 14 is formed, and the liquid as a fluid is enclosed with this fluid enclosure room 26. the disc-like batch member 30 which has the orifice passage 28 at a periphery in the inner circumference of the 2nd fixing metal 12 in the fluid enclosure room 26 -- liquid -- it is attached densely. The fluid enclosure room 26 is divided into 1st room 26a by the side of a vibrationproofing base, and 2nd room 26b by the side of diaphragm by this batch member 30, and both ** 26a and 26b are made open for free passage by the orifice passage 28.

[0020] The batch member 30 consists of the disc-like rubber membrane 32 as valve portion material which divides 1st room 26a and 2nd room 26b, a top member 34 allotted to the vibrationproofing base 14 side about rubber membrane 32, and a bottom member 36 allotted to the diaphragm 22 side about rubber membrane 32.

[0021] With this operation gestalt, the top member 34 is the mold Plastic solid of resin (for example, PPA (poly phthalamide)), and as shown in drawing 2, it consists of central shelf 34a which is faced and allotted to the top face of rubber membrane 32, and restricts the variation rate to the upper part, and periphery section 34b equipped with the slot 38 for forming the orifice passage 28. Periphery section 34b makes approximate circle tubed, and is equipped with the slot 38 which extends over 2 rounds of upper and lower sides in a hoop direction in the peripheral face. And let space surrounded by this slot 38 and thin film rubber section 14a of the vibrationproofing base 14 be the orifice passage 28. The opening 40 which makes the orifice passage 28 and 1st room 26a open for free passage because some upper walls cut and lack is formed in periphery section 34b.

[0022] It is built over central shelf 34a of the top member 34 so that the interior of cylinder-like periphery section 34b may be divided up and down in a shaft-orientations center section, therefore it is making disc-like. Central shelf 34a is formed in the shape of a grid, and is equipped with two or more through tubes 42 formed of this grid. The crevice 44 for holding rubber membrane 32 is established in the field of the side which counters the inferior surface of tongue 32 of central shelf 34a, i.e., rubber membrane. The even opening end face 46 which makes the shape of a ring is secured in the perimeter of a crevice 44.

[0023] Disc-like central shelf 36a which the bottom member 36 is the press-forming object of a metal plate with this operation gestalt, is faced and allotted to the inferior surface of tongue of rubber membrane 32, and restricts the variation rate to the lower part. It consists of periphery section 36b by which is made to go away with the tubed metallic ornaments 16 and the bottom metallic ornaments 18, and caulking immobilization is carried out in the section, and while forming the orifice passage 28 with periphery section 34b of the top member 34 between central shelf 36a and periphery section 36b, step 36c is formed. The bottom member 36 is pressed by carrying out caulking immobilization of the periphery section 36b to level difference section 14b in which the upper limit side of periphery section 34b of the top member 34 was established by the bottom periphery section of the vibrationproofing base 14.

[0024] Central shelf 36a of the bottom member 36 is projected and prepared in the upper part from inside step 36c, and it is allotted inside [lower] periphery section 34b so that phase opposite may be carried out with central shelf 34a of the top member 34. Central shelf 36a of the bottom member 36 is the flat-surface section which contacts the opening end face 46 so that opening of the crevice 44 of the top member 34 may be plugged up, and it does not have a crevice for holding rubber membrane 32 like the top member 34. Therefore, by pressing central shelf 36a of the bottom member 36 to the opening end face 46 of the crevice 44 of the top member 34 by the above-mentioned caulking immobilization, as shown in drawing 2 (c), between the top member 34 and the bottom member 36, the clearance 48 which restricts the variation rate of rubber membrane 32 is formed, and the dimension X of this clearance 48 is prescribed by only the depth of a crevice 44.

[0025] In addition, central shelf 36a of a bottom member is formed in the shape of [the / as central shelf 34a of the top member 34 / same] a grid, and is equipped with two or more through tubes 50 formed of this grid. Moreover, the opening 52 which makes the orifice passage 28 and 2nd room 26b open for free passage is formed in inside step of bottom member 36 36c.

[0026] Rubber membrane 32 is allotted to the above-mentioned clearance 48, and the variation rate of the vertical direction is restricted between up-and-down central shelf 34a and 36a. the dimension X of a clearance 48 is greatly set up a little rather than the thickness of rubber membrane 32 -- having -- **** -- thereby -- vertical movement of rubber membrane 32 -- the variation rate is made possible.

[0027] The protruding line 54 which encloses the periphery of each through tubes 42 and 50 over the perimeter in contact with the field where the up-and-down central shelves 34a and 36a counter is projected and formed in the front face of rubber membrane 32 at one, and the leakage of the fluid between the through tube 42 which adjoins under vibration of the large amplitude thereby especially with a low frequency, and 50 is prevented.

[0028] As mentioned above, with the vibration isolator of this becoming operation gestalt, the dimension X of the clearance 48 in which

rubber membrane 32 is held is prescribed by only the depth of the crevice 44 established in the top member 34. Therefore, the rigidity which forms with a metal about the bottom member 36, and bears caulking reinforcement is securable, and the dimensional accuracy of a movable clearance can be secured, without forming and carrying out cutting by resin about the top member 34.

[0029] In order only for the depth of the crevice 44 of the top member 34 to prescribe the movable clearance dimension of rubber membrane 32, the top member 34 and the bottom member 36 dash as the periphery section of the opening end face 46 of a crevice 44, and central shelf 36a, contact only in the section, and they consist of above-mentioned vibration isolators by other parts so that both may not contact. In this case, positioning with the top member 34 and the bottom member 36 is made by the inner skin of the tubed metallic ornaments 16 in the direction of a path, and the vibrationproofing base 14 level-difference section 14b makes it solve in the height direction, and it is made between the sections.

[0030] And about a hand of cut, as shown in drawing 3, it can position by extending the lower limit of the wall 56 in periphery section 34b of the top member 34. A wall 56 is intercepting the flow to a hoop direction in the lower limit section of the orifice passage 28, and is a wall for leading a liquid to the opening 52 of the bottom member 36. While positioning the top member 34 and the bottom member 36 in a hand of cut by extending the lower limit of this wall 56 caudad rather than the inferior surface of tongue of periphery section 34b, inserting this extension 58 in the opening 52 of the bottom member 36, and dashing against one opening edge, the opening area of opening 52 is securable.

[0031] Moreover, in the top member 34 and the bottom member 36, since [of the opening end face 46 of a crevice 44, and the periphery section of central shelf 36a] it dashed and was made to contact only in the section, as shown in drawing 2 (b), the clearance is secured between the lower limit of periphery section 34b of the top member 34, and inside step of bottom member 36 36c. Although leaking without intercepting completely the liquid which flows the orifice passage 28 by this clearance with a wall 56 is assumed, such leak can be prevented by having extended the lower limit of a wall 56 as mentioned above.

[0032] moreover, it is shown in drawing 3 (c) -- as -- the extension 58 of a wall 56 -- hook 60 -- preparing -- this hook 60 -- the opening edge of the opening 52 of the bottom member 36 -- you may hook -- thereby -- rotation prevention -- ** -- omission of the top member 34 at the time of manufacture and the bottom member 36 can be prevented.

[0033] Drawing 4 is the sectional view of the vibration isolator concerning other operation gestalten. Although resin is adopted like [member / 34 / top] the above-mentioned operation gestalt with this operation gestalt, it replaced with the press steel plate about the bottom member 36, and the aluminum cast is adopted.

[0034] Moreover, with this operation gestalt, slot 38b for forming the orifice passage 28 not only in the top member 34 but in the periphery section of the bottom member 36 is prepared. As shown in drawing 4 and 5, the top member 34 becomes a detail from periphery section 34b equipped with the above-mentioned central shelf 34a and slot 38a for forming upper passage 28a among the orifice passage 28 of 2 rounds of upper and lower sides. On the other hand, the bottom member 36 consists of periphery section 36b equipped with slot 38b for forming the above-mentioned central shelf 36a and lower passage 28b. The wall of the periphery section 36b top which makes the typeface of cross-section abbreviation KO forms upper passage 28a with periphery section 34b of the top member 34, a lower wall is installed by the method of outside, you make it go away 2nd fixing-metal 12, and caulking immobilization is carried out in the section.

[0035] Also with this operation gestalt, a crevice 44 is established in central shelf 36a of the top member 34, by dashing so that flat central shelf 36a of the bottom member 36 may close opening of this crevice 44, the clearance 48 which restricts the variation rate of rubber membrane 32 is formed between the top member 34 and the bottom member 36, and the dimension X of this clearance 48 is specified by only the depth of a crevice 44.

[0036] Moreover, as shown in drawing 5 in this case as positioning in the hand of cut of the top member 34 and the bottom member 36, the lower limit of the wall 62 prepared in the top member 34 is extended. It is the wall established in order to lead a liquid to lower passage 28b from upper passage 28a, and this wall 62 extended the lower limit of this wall 62, it is inserting in the opening 66 for positioning which formed the extension 64 in periphery section 36b of the bottom member 36, and has positioned the top member 34 and the bottom member 36 in a hand of cut. Moreover, this has prevented leak of the liquid in the clearance between a wall 62 and periphery section 36b of the bottom member 36.

[0037] the effectiveness of the operation gestalt shown in above-mentioned drawing 1 with this operation gestalt -- in addition, since both the top member 34 and the bottom member 36 were used as mold mold goods, the effectiveness that a design degree of freedom is high is acquired.

[0038]

[Effect of the Invention] the dimension which regulates the variation rate of elastic membrane as it is the fluid filled system vibration isolator of this invention -- the part I material or the part II material -- since it can set up only by the side, the dimensional accuracy of the movable clearance between elastic membrane can be improved.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the fluid filled system vibration isolator used for mainly supporting oscillating objects, such as an automobile engine, in vibrationproofing.

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EFFECT OF THE INVENTION

[Effect of the Invention] the dimension which regulates the variation rate of elastic membrane as it is the fluid filled system vibration isolator of this invention -- the part I material or the part II material -- since it can set up only by the side, the dimensional accuracy of the movable clearance between elastic membrane can be improved.

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TECHNICAL PROBLEM

[Description of the Prior Art] The 1st fixing metal with which a fluid filled system vibration isolator is generally attached in an oscillating generating object side, such as an engine, The 2nd tubed fixing metal by which attachment immobilization is carried out at the support side of a car-body frame etc. Join together through the vibrationproofing base which consists of rubber material, and counter with a vibrationproofing base and diaphragm is allotted to the lower part side of the 2nd fixing metal of the above. Make a room into a fluid enclosure room among between a vibrationproofing base and diaphragm, and this fluid enclosure room is divided into two by the side of a vibrationproofing base and diaphragm by the batch member. It is constituted so that it may make it come to be open for free passage of both ** with an orifice and a periodic-damping function may be achieved according to the liquid convection effect between both the liquid rooms by the orifice, or the vibration-deadening effectiveness of a vibrationproofing base.

[0003] In this fluid filled system vibration isolator, what was constituted from elastic membrane as valve portion material which carries out reciprocation displacement of the batch member, and a grid-like member of the vertical pair which restricts a motion of this elastic membrane is well-known. Under vibration of the large amplitude with a low frequency like vibration resulting from the irregularity of the road surface at the time of car transit, the vibration isolator with such elastic membrane demonstrates a periodic-damping function because a fluid flows for two rooms through an orifice. On the other hand, under vibration of tiny vibration width of face with a high frequency like vibration resulting from an engine rotational frequency, the above-mentioned orifice does not function but demonstrates a periodic-damping function according to reciprocation deformation of elastic membrane.

[0004] About this kind of vibration isolator, what constituted the grid from an orifice member of the vertical pair which forms orifice passage in the periphery section in preparation for a center section, and elastic membrane held between both orifice members as a batch member into which an up-and-down liquid room is divided is indicated by JP,6-221368,A. In this vibration isolator, fitting of the orifice member which consists of the same ingredient was carried out, in order to set up orifice passage and the movable clearance between elastic membrane and to raise fitting precision, the fitting side had to be cut or dimensional accuracy of the movable clearance between elastic membrane had to be sacrificed. That is, when having set up the clearance dimension at the time of combining, therefore combining the large components of especially manufacture tolerance by each dimension setup in the orifice member of the upper and lower sides which fit in in this case, it was not easy to secure the dimensional accuracy of a movable clearance.

[0005] This invention is made in view of the above point, and aims at improving the dimensional accuracy of the movable clearance for the elastic membrane in a batch member.

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MEANS

[Means for Solving the Problem] The 2nd attachment member in which the fluid filled system vibration isolator of this invention has the 1st attachment member and a tubed drum section, The vibrationproofing base which consists of rubber material which is interposed between these attachment members and combines both the attachment member, The diaphragm which was made to counter said vibrationproofing base and was attached in said 2nd attachment member, The fluid enclosure room prepared between the aforementioned vibrationproofing base and diaphragm in the inside of said 2nd attachment member, The batch member which forms the orifice passage which it is attached [passage] in the inner circumference of said 2nd attachment member, and said fluid enclosure room is divided [passage] into the 1st room by the side of a vibrationproofing base, and the 2nd room by the side of diaphragm, and makes the periphery section open the 1st room and the 2nd room for free passage, The elastic membrane into which a preparation and said batch member divide the 1st aforementioned room and the 2nd room, It comes to have the part I material allotted to the vibrationproofing base side about this elastic membrane, and the part II material which presses the periphery section of said part I material in the fluid enclosure room side periphery section of said vibrationproofing base by it being allotted to a diaphragm side about said elastic membrane, and caulking immobilization of the periphery section being carried out at said 2nd attachment member. While preparing the crevice for holding said elastic membrane in the aforementioned part I material or the part II material, the flat-surface section which contacts an opening end face is prepared so that opening of this crevice may be plugged up on another side, and the clearance which restricts the variation rate of said elastic membrane between said part I material and part II material is formed.

[0007] The dimension is prescribed by the depth of the crevice which established the movable clearance for elastic membrane in the part I material or the part II material in the batch member which forms orifice passage in the periphery section as it is the vibration isolator of this invention, namely, the dimension which regulates the variation rate of elastic membrane -- the part I material or the part II material -- it can set up only by the side. Therefore, the dimensional accuracy of a movable clearance can be improved compared with the case where a dimension setup is carried out with both combination. Close dimensional accuracy is called for also about the movable clearance between elastic membrane by the advancement of the military requirement of the latest car, and if it is this invention, it can respond cheaply in simple combination to such a demand.

[0008] In the vibration isolator of this invention, the part I material and the part II material can be formed with a heterogeneous ingredient, and by establishing the above-mentioned crevice in the small member of manufacture tolerance in that case, while is accurate and they can set up a movable clearance only by the member.

[0009] For example, said crevice is established in said part I material, this part I material may be formed with resin, said flat-surface section may be prepared in said part II material, and this part II material may be formed with a metal. In this case, about the part II material which carries out caulking immobilization, the reinforcement which is equal to a caulking is securable by forming with metals, such as a press steel plate and an aluminum cast. On the other hand, the dimensional accuracy of a movable clearance can be secured about the part I material which performs a dimension setup of a movable clearance, without carrying out cutting by forming by resin with sufficient dimensional accuracy. Moreover, lightweight-ization can also be attained by forming by resin.

[0010] As for the part I material and the part II material, in the vibration isolator of this invention, constituting so that it may not contact fundamentally is desirable by parts other than the contact section of the above-mentioned flat-surface section and a crevice opening end face. However, in order to position both in a hand of cut, the part may touch.

[0011] For example, when the part I material equips the periphery section with the wall which intercepts the flow to the hoop direction of said orifice passage, the tip of this wall may be extended and you may insert in the hole which prepared this extension in the periphery section of said part II material. In this case, the part I material and the part II material can be positioned in a hand of cut by applying an extension to the opening edge of the above-mentioned hole. Moreover, since the wall is extended to the part II material side in this case, leak of a fluid [**** / from between the tip of a wall and the part II material / un-] can also be prevented by this extension.

[0012] Moreover, a hook may be prepared in the extension of said wall, this hook may be hooked on the opening edge of said hole, and, thereby, omission prevention with the part I material and the part II material at the time of manufacture and rotation prevention are attained.

[0013]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to a drawing.

[0014] Drawing 1 is drawing of longitudinal section of the fluid filled system vibration isolator concerning 1 operation gestalt of this invention. This vibration isolator comes to join together the 1st fixing metal 10 attached in an oscillating generating object side, such as an engine, and the 2nd fixing metal 12 which has the tubed drum section by which attachment immobilization is carried out at the support side of a car-body frame etc. through the vibrationproofing base 14 which consists of rubber material.

[0015] The 2nd fixing metal 12 consists of tubed metallic ornaments 16 and bottom metallic ornaments 18 concluded by the lower limit 16a with the caulking means, and the bolt 19 for attachment protrudes on the bottom metallic ornaments 18.

[0016] The 1st fixing metal 10 is the plate-like part material which set necessary spacing to the axial center section upper part of the 2nd fixing metal 12, and was allotted to it, and the bolt 20 for attachment protrudes on the center section towards the upper part.

[0017] The 1st fixing metal 10 fixed [the appearance] the abbreviation truncated cone form with the vulcanization shaping means on nothing and its top face, and the upper limit section of the 2nd fixing metal 12 has fixed the vibrationproofing base 14 with the vulcanization shaping means in the lower limit periphery section. In the case of drawing, diameter expansion formation of the upper limit section 16b of the tubed metallic ornaments 16 is carried out at the shape of a taper, and vulcanization adhesion of the lower periphery of the vibrationproofing base 14 is carried out at this upper limit section 16b. Thin film rubber section 14a installed in the shape of a thin film from the vibrationproofing base 14 is prepared in the internal surface of the 2nd fixing metal 12.

[0018] The lower part side of the 2nd fixing metal 12 is equipped with the diaphragm 22 which consists of rubber membrane so that it may counter with the vibrationproofing base 14. Diaphragm 22 equips the periphery section with the ring-like reinforcement metallic ornaments 24, and it is attached in the 2nd fixing metal 12 by these reinforcement metallic ornaments 24 making it go away with the tubed metallic ornaments 16 and the bottom metallic ornaments 18, and caulking immobilization being carried out at the section.

[0019] Inside the 2nd fixing metal 12, the fluid enclosure room 26 sealed between diaphragm 22 and the vibrationproofing base 14 is formed,

and the liquid as a fluid is enclosed with this fluid enclosure room 26, the disc-like batch member 30 which has the orifice passage 28 at a periphery in the inner circumference of the 2nd fixing metal 12 in the fluid enclosure room 26 — liquid — it is attached densely. The fluid enclosure room 26 is divided into 1st room 26a by the side of a vibrationproofing base, and 2nd room 26b by the side of diaphragm by this batch member 30, and both ** 26a and 26b are made open for free passage by the orifice passage 28.

[0020] The batch member 30 consists of a disc-like rubber membrane 32 as valve portion material which divides 1st room 26a and 2nd room 26b, a top member 34 allotted to the vibrationproofing base 14 side about rubber membrane 32, and a bottom member 36 allotted to the diaphragm 22 side about rubber membrane 32.

[0021] With this operation gestalt, the top member 34 is the mold Plastic solid of resin (for example, PPA (poly phthalamide)), and as shown in drawing 2, it consists of central shelf 34a which is faced and allotted to the top face of rubber membrane 32, and restricts the variation rate to the upper part, and periphery section 34b equipped with the slot 38 for forming the orifice passage 28. Periphery section 34b makes approximate circle tubed, and is equipped with the slot 38 which extends over 2 rounds of upper and lower sides in a hoop direction in the peripheral face. And left space surrounded by this slot 38 and thin film rubber section 14a of the vibrationproofing base 14 be the orifice passage 28. The opening 40 which makes the orifice passage 28 and 1st room 26a open for free passage because some upper walls cut and lack is formed in periphery section 34b.

[0022] It is built over central shelf 34a of the top member 34 so that the interior of cylinder-like periphery section 34b may be divided up and down in a shaft-orientations center section, therefore it is making disc-like. Central shelf 34a is formed in the shape of a grid, and is equipped with two or more through tubes 42 formed of this grid. The crevice 44 for holding rubber membrane 32 is established in the field of the side which counters the inferior surface of tongue 32 of central shelf 34a, i.e., rubber membrane. The even opening end face 46 which makes the shape of a ring is secured in the perimeter of a crevice 44.

[0023] Disc-like central shelf 36a which the bottom member 36 is the press-forming object of a metal plate with this operation gestalt, is faced and allotted to the inferior surface of tongue of rubber membrane 32, and restricts the variation rate to the lower part. It consists of periphery section 36b by which is made to go away with the tubed metallic ornaments 16 and the bottom metallic ornaments 18, and caulking immobilization is carried out in the section, and while forming the orifice passage 28 with periphery section 34b of the top member 34 between central shelf 36a and periphery section 36b, step 36c is formed. The bottom member 36 is pressed by carrying out caulking immobilization of the periphery section 36b to level difference section 14b in which the upper limit side of periphery section 34b of the top member 34 was established by the bottom periphery section of the vibrationproofing base 14.

[0024] Central shelf 36a of the bottom member 36 is projected and prepared in the upper part from inside step 36c, and it is allotted inside [lower] periphery section 34b so that phase opposite may be carried out with central shelf 34a of the top member 34. Central shelf 36a of the bottom member 36 is the flat-surface section which contacts the opening end face 46 so that opening of the crevice 44 of the top member 34 may be plugged up, and it does not have a crevice for holding rubber membrane 32 like the top member 34. Therefore, by pressing central shelf 36a of the bottom member 36 to the opening end face 46 of the crevice 44 of the top member 34 by the above-mentioned caulking immobilization, as shown in drawing 2 (c), between the top member 34 and the bottom member 36, the clearance 48 which restricts the variation rate of rubber membrane 32 is formed, and the dimension X of this clearance 48 is prescribed by only the depth of a crevice 44.

[0025] In addition, central shelf 36a of a bottom member is formed in the shape of [the / as central shelf 34a of the top member 34 / same] a grid, and is equipped with two or more through tubes 50 formed of this grid. Moreover, the opening 52 which makes the orifice passage 28 and 2nd room 26b open for free passage is formed in inside step of bottom member 36 36c.

[0026] Rubber membrane 32 is allotted to the above-mentioned clearance 48, and the variation rate of the vertical direction is restricted between up-and-down central shelf 34a and 36a. the dimension X of a clearance 48 is greatly set up a little rather than the thickness of rubber membrane 32 — having — **** — thereby — vertical movement of rubber membrane 32 — the variation rate is made possible.

[0027] The protruding line 54 which encloses the periphery of each through tubes 42 and 50 over the perimeter in contact with the field where the up-and-down central shelves 34a and 36a counter is projected and formed in the front face of rubber membrane 32 at one, and the leakage of the fluid between the through tube 42 which adjoins under vibration of the large amplitude thereby especially with a low frequency, and 50 is prevented.

[0028] As mentioned above, with the vibration isolator of this becoming operation gestalt, the dimension X of the clearance 48 in which rubber membrane 32 is held is prescribed by only the depth of the crevice 44 established in the top member 34. Therefore, the rigidity which forms with a metal about the bottom member 36, and bears caulking reinforcement is securable, and the dimensional accuracy of a movable clearance can be secured, without forming and carrying out cutting by resin about the top member 34.

[0029] In order only for the depth of the crevice 44 of the top member 34 to prescribe the movable clearance dimension of rubber membrane 32, the top member 34 and the bottom member 36 dash as the periphery section of the opening end face 46 of a crevice 44, and central shelf 36a, contact only in the section, and they consist of above-mentioned vibration isolators by other parts so that both may not contact. In this case, positioning with the top member 34 and the bottom member 36 is made by the inner skin of the tubed metallic ornaments 16 in the direction of a path, and the vibrationproofing base 14 level-difference section 14b Makes it solve in the height direction, and it is made between the sections.

[0030] And about a hand of cut, as shown in drawing 3, it can position by extending the lower limit of the wall 56 in periphery section 34b of the top member 34. A wall 56 is intercepting the flow to a hoop direction in the lower limit section of the orifice passage 28, and is a wall for leading a liquid to the opening 52 of the bottom member 36. While positioning the top member 34 and the bottom member 36 in a hand of cut by extending the lower limit of this wall 56 caudad rather than the inferior surface of tongue of periphery section 34b, inserting this extension 58 in the opening 52 of the bottom member 36, and dashing against one opening edge, the opening area of opening 52 is securable.

[0031] Moreover, in the top member 34 and the bottom member 36, since [of the opening end face 46 of a crevice 44, and the periphery section of central shelf 36a] it dashed and was made to contact only in the section, as shown in drawing 2 (b), the clearance is secured between the lower limit of periphery section 34b of the top member 34, and inside step of bottom member 36 36c. Although leaking without intercepting completely the liquid which flows the orifice passage 28 by this clearance with a wall 56 is assumed, such leak can be prevented by having extended the lower limit of a wall 56 as mentioned above.

[0032] moreover, it is shown in drawing 3 (c) — as — the extension 58 of a wall 56 — hook 60 — preparing — this hook 60 — the opening edge of the opening 52 of the bottom member 36 — you may hook — thereby — rotation prevention — ** — omission of the top member 34 at the time of manufacture and the bottom member 36 can be prevented.

[0033] Drawing 4 is the sectional view of the vibration isolator concerning other operation gestalten. Although resin is adopted like [member / 34 / top] the above-mentioned operation gestalt with this operation gestalt, it replaced with the press steel plate about the bottom member 36, and the aluminum cast is adopted.

[0034] Moreover, with this operation gestalt, slot 38b for forming the orifice passage 28 not only in the top member 34 but in the periphery section of the bottom member 36 is prepared. As shown in drawing 4 and 5, the top member 34 becomes a detail from periphery section 34b equipped with the above-mentioned central shelf 34a and slot 38a for forming upper passage 28a among the orifice passage 28 of 2 rounds of upper and lower sides. On the other hand, the bottom member 36 consists of periphery section 36b equipped with slot 38b for forming the above-mentioned central shelf 36a and lower passage 28b. The wall of the periphery section 36b top which makes the typeface

of cross-section abbreviation KO forms upper passage 28a with periphery section 34b of the top member 34, a lower wall is installed by the method of outside, you make it go away 2nd fixing-metal 12, and caulking immobilization is carried out in the section.

[0035] Also with this operation gestalt, a crevice 44 is established in central shelf 36a of the top member 34, by dashing so that flat central shelf 36a of the bottom member 36 may be opening of this crevice 44, the clearance 48 which sets the variation rate of rubber membrane 32 is formed between the top member 34 and the bottom member 36, and the dimension of this clearance 48 is specified by only the depth of a crevice 44.

[0036] Moreover, as shown in drawing 5 in this case as positioning in the hand of cut of the top member 34 and the bottom member 36, the lower limit of the wall 62 prepared in the top member 34 is extended. It is the wall established in order to lead a liquid to lower passage 28b from upper passage 28a, and this wall 62 extended the lower limit of this wall 62, it is inserting in the opening 66 for positioning which formed the extension 64 in periphery section 36b of the bottom member 36, and has positioned the top member 34 and the bottom member 36 in a hand of cut. Moreover, this has prevented leak of the liquid in the clearance between a wall 62 and periphery section 36b of the bottom member 36.

[0037] the effectiveness of the operation gestalt shown in above-mentioned drawing 1 with this operation gestalt -- in addition, since both the top member 34 and the bottom member 36 were used as mold mold goods, the effectiveness that a design degree of freedom is high is acquired.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing of longitudinal section of the vibration isolator concerning 1 operation gestalt of this invention.

[Drawing 2] The sectional view in the combination condition and (c of the sectional view which (a) decomposes the batch member in this operation gestalt, and is shown, and (b)) are the A section enlarged drawings of (b).

[Drawing 3] The side elevation of a batch member and (c of the side elevation of a top member [in / in (a) / this operation gestalt] and (b)) are the B section enlarged drawings of (b).

[Drawing 4] It is the sectional view of the vibration isolator concerning other operation gestalten.

[Drawing 5] the side elevation decomposing and showing the batch member which (a) requires for other operation gestalten, and (b) -- it is a side elevation in the attachment condition.

[Description of Notations]

- 10 The 1st fixing metal
- 12 The 2nd fixing metal
- 14 Vibrationproofing base
- 22 Diaphragm
- 26 Fluid enclosure room
- 28 Orifice
- 30 Batch member
- 32 Rubber membrane
- 34 Top member
- 36 Bottom member
- 36a Central shelf
- 44 Crevice
- 48 Opening end face
- 48 Wall
- 58 64 Extension
- 52 66 Opening
- 60 Hook

[Translation done.]

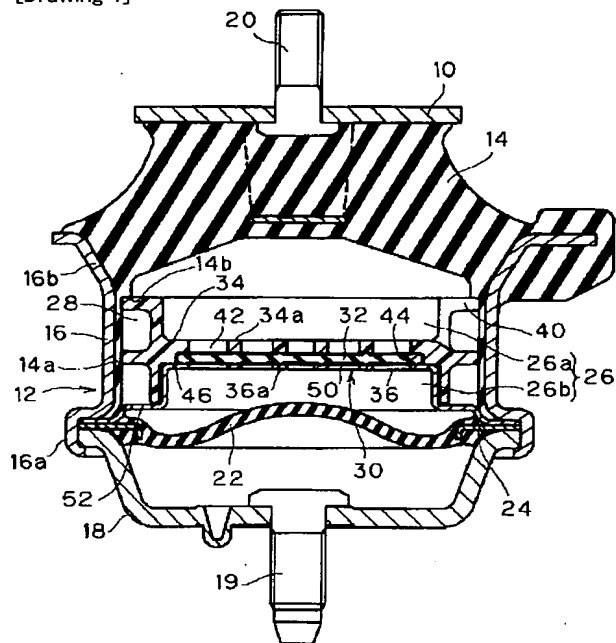
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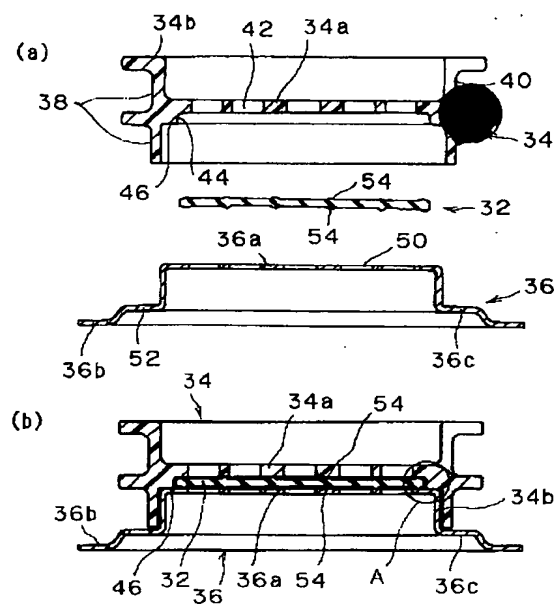
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DRAWINGS

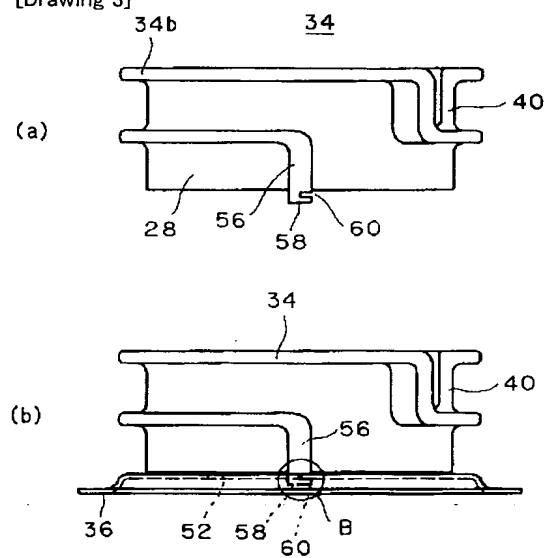
[Drawing 1]



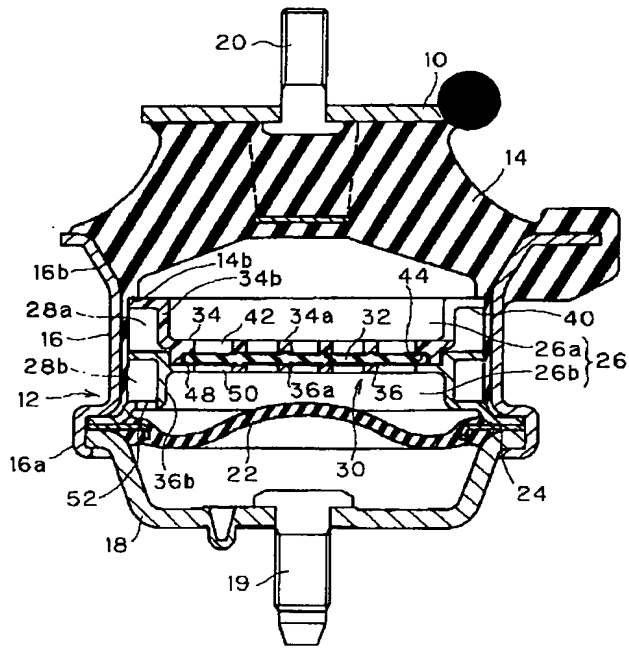
[Drawing 2]



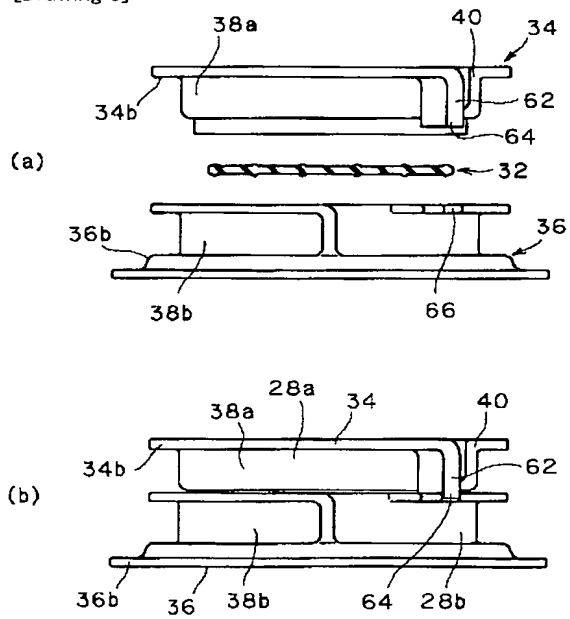
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]

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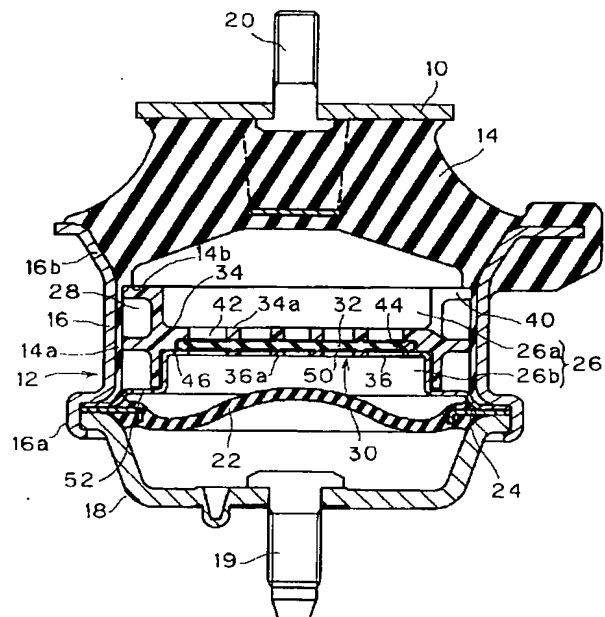
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(54) 【発明の名称】 流体封入式防振装置

(57) 【要約】

【課題】 仕切部材における弾性膜のための可動隙間の寸法精度を向上した防振装置を提供する。

【解決手段】 第1取付部材10と第2取付部材12とが防振基体14を介して結合され、ダイヤフラム22と防振基体14との間に設けた流体封入室26が仕切部材30により2室に仕切られ、両室26a、26bがオリフィス28で連通させた防振装置において、仕切部材30が、弾性膜32と、その変位を制限する第1部材34及び第2部材36からなり、第1部材34に弾性膜32を収容するための凹部44を設け、第2部材36に凹部44の開口部を塞ぐように開口端面46に当接する平面部36aを設けて、第1部材34と第2部材36との間に弾性膜32の変位を制限する隙間48を形成した。



【特許請求の範囲】

【請求項1】第1取付部材と、筒状胴部を有する第2取付部材と、これら取付部材の間に介設されて両取付部材を結合するゴム材よりなる防振基体と、前記防振基体に対向させて前記第2取付部材に取り付けたダイヤフラムと、前記第2取付部材の内側において前記の防振基体とダイヤフラムとの間に設けられた流体封入室と、前記第2取付部材の内周に嵌着されて前記流体封入室を防振基体側の第1室とダイヤフラム側の第2室とに仕切り、外周部に第1室と第2室を連通させるオリフィス流路を形成する仕切部材と、を備え、

前記仕切部材が、前記の第1室と第2室を仕切る弾性膜と、該弾性膜に関して防振基体側に配された第1部材と、前記弾性膜に関してダイヤフラム側に配されて周縁部が前記第2取付部材にかしめ固定されることで前記第1部材の周縁部を前記防振基体の流体封入室側周縁部に押圧する第2部材とを備えてなり、前記の第1部材と第2部材のいずれか一方に前記弾性膜を收容するための凹部を設けるとともに、他方に該凹部の開口部を塞ぐように開口端面に当接する平面部を設け、前記第1部材と第2部材との間に前記弾性膜の変位を制限する隙間を形成した、

ことを特徴とする流体封入式防振装置。

【請求項2】前記の第1部材と第2部材が異質材料で形成されたことを特徴とする請求項1記載の流体封入式防振装置。

【請求項3】前記凹部を前記第1部材に設けて該第1部材を樹脂により形成し、前記平面部を前記第2部材に設けて該第2部材を金属により形成したことを特徴とする請求項2記載の流体封入式防振装置。

【請求項4】前記第1部材が外周部に前記オリフィス流路の周方向への流れを遮断する縦壁を備えており、該縦壁の先端を延長し、この延長部を前記第2部材に設けた穴に挿入することで、前記第1部材と第2部材とを回転方向において位置決めしたことを特徴とする請求項1～3のいずれかに記載の流体封入式防振装置。

【請求項5】前記縦壁の延長部にフックを設けて、該フックを前記穴の開口縁部に引っ掛けたことを特徴とする請求項4記載の流体封入式防振装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、主として自動車エンジン等の振動体を防振的に支承するのに用いられる流体封入式防振装置に関するものである。

【0002】

【従来の技術及び発明が解決しようとする課題】一般に、流体封入式防振装置は、エンジン等の振動発生体側に取り付けられる第1取付金具と、車体フレーム等の支持側に取付固定される筒状の第2取付金具とを、ゴム材よりなる防振基体を介して結合し、上記第2取付金具の

下部側に防振基体と対向してダイヤフラムを配し、防振基体とダイヤフラムとの間の内室を流体封入室とし、この流体封入室を仕切部材により防振基体側とダイヤフラム側との2室に仕切り、両室をオリフィスにより連通せしめてなり、オリフィスによる両液室間の液流動効果や防振基体の制振効果により、振動減衰機能を果たすように構成されている。

【0003】かかる流体封入式防振装置において、仕切部材を、往復動変位する弁部材としての弾性膜と、該弾性膜の動きを制限する上下一対の格子状部材とで構成したものが公知である。このような弾性膜を持つ防振装置は、車両走行時の路面の凹凸に起因する振動のような周波数の低い大振幅の振動下では、流体がオリフィスを通じて2室間を流動することで振動減衰機能を発揮する。一方、エンジンの回転数に起因する振動のような周波数の高い微振幅の振動下では、上記オリフィスは機能せず、弾性膜の往復動変形により振動減衰機能を発揮する。

【0004】この種の防振装置について、特開平6-221368号公報には、上下の液室を仕切る仕切部材として、中央部に格子を備え外周部にオリフィス流路を形成する上下一対のオリフィス部材と、両オリフィス部材間に保持された弾性膜とで構成したものが開示されている。この防振装置では、同一材料からなるオリフィス部材を嵌合させてオリフィス流路と弾性膜の可動隙間とを設定するもので、嵌合精度を上げるためには、嵌合面を切削するか、弾性膜の可動隙間の寸法精度を犠牲にするしかなかった。すなわち、この場合、嵌合する上下のオリフィス部材におけるそれぞれの寸法設定により、組み合わせた際の隙間寸法を設定しており、そのため、特に製造公差の大きい部品同士を組合せる場合、可動隙間の寸法精度を確保することが容易でなかった。

【0005】本発明は、以上の点に鑑みてなされたものであり、仕切部材における弾性膜のための可動隙間の寸法精度を向上することを目的とする。

【0006】

【課題を解決するための手段】本発明の流体封入式防振装置は、第1取付部材と、筒状胴部を有する第2取付部材と、これら取付部材の間に介設されて両取付部材を結合するゴム材よりなる防振基体と、前記防振基体に対向させて前記第2取付部材に取り付けたダイヤフラムと、前記第2取付部材の内側において前記の防振基体とダイヤフラムとの間に設けられた流体封入室と、前記第2取付部材の内周に嵌着されて前記流体封入室を防振基体側の第1室とダイヤフラム側の第2室とに仕切り、外周部に第1室と第2室を連通させるオリフィス流路を形成する仕切部材と、を備え、前記仕切部材が、前記の第1室と第2室を仕切る弾性膜と、該弾性膜に関して防振基体側に配された第1部材と、前記弾性膜に関してダイヤフラム側に配されて周縁部が前記第2取付部材にかしめ固

定されることで前記第１部材の周縁部を前記防振基体の流体封入室側周縁部に押圧する第２部材とを備えてなり、前記の第１部材と第２部材のいずれか一方に前記弾性膜を収容するための凹部を設けるとともに、他方に該凹部の開口部を塞ぐように開口端面に当接する平面部を設け、前記第１部材と第２部材との間に前記弾性膜の変位を制限する隙間を形成したものである。

【０００７】本発明の防振装置であると、外周部にオリフィス流路を形成する仕切部材において、弾性膜のための可動隙間は第１部材と第２部材のいずれか一方に設けた凹部の深さによりその寸法が規定される。すなわち、弾性膜の変位を規制する寸法を第１部材と第２部材のいずれか一方側のみで設定することができる。そのため、双方の組合せにより寸法設定する場合に比べて、可動隙間の寸法精度を向上することができる。最近の車両の要求性能の高度化により弾性膜の可動隙間についても高い寸法精度が求められており、本発明であればこのような要求に対し簡素な組合せで安価に応えることができる。

【０００８】本発明の防振装置においては、第１部材と第２部材とは異質材料で形成することができ、その場合、製造公差の小さい部材に上記凹部を設けることにより、精度の良い一方の部材のみで可動隙間を設定することができる。

【０００９】例えば、前記凹部を前記第１部材に設けて該第１部材を樹脂により形成し、前記平面部を前記第２部材に設けて該第２部材を金属により形成してもよい。この場合、かしめ固定する第２部材については、プレス鋼板やアルミ鋳造品等の金属で形成することでかしめに耐える強度を確保することができる。一方、可動隙間の寸法設定を行う第１部材については、寸法精度のよい樹脂で形成することで切削加工することなく可動隙間の寸法精度を確保することができる。また、樹脂で形成することで軽量化も図れる。

【００１０】本発明の防振装置において、第１部材と第２部材は上記の平面部と凹部開口端面との当接部以外の部位では基本的には接触しないように構成することが好ましい。但し、両者を回転方向において位置決めするために一部が接触していても構わない。

【００１１】例えば、第１部材が外周部に前記オリフィス流路の周方向への流れを遮断する縦壁を備える場合に、該縦壁の先端を延長し、この延長部を前記第２部材の周縁部に設けた穴に挿入してもよい。この場合、延長部を上記穴の開口縁に当てることで、第１部材と第２部材とを回転方向において位置決めすることができる。また、この場合、縦壁を第２部材側まで延長しているため、縦壁の先端と第２部材との間からの不所望な流体のリークをこの延長部により防止することもできる。

【００１２】また、前記縦壁の延長部にフックを設けて、該フックを前記穴の開口縁部に引っ掛けてもよく、これにより、製造時における第１部材と第２部材との脱

落防止や回転防止が可能となる。

【００１３】

【発明の実施の形態】以下、本発明の実施形態を図面を参照して説明する。

【００１４】図１は本発明の１実施形態に係る流体封入式防振装置の縦断面図である。この防振装置は、エンジン等の振動発生体側に取り付けられる第１取付金具１０と、車体フレーム等の支持側に取付固定される筒状胴部を有する第２取付金具１２とを、ゴム材よりなる防振基体１４を介して結合してなる。

【００１５】第２取付金具１２は、筒状金具１６と、その下端１６ａにかしめ手段により締結された底金具１８とからなり、底金具１８に取付用ボルト１９が突設されている。

【００１６】第１取付金具１０は、第２取付金具１２の軸心部上方に所要の間隔をおいて配された板状部材であり、その中央部に取付用ボルト２０が上方に向けて突設されている。

【００１７】防振基体１４は、外形が略截頭円錐形をなし、その上面に第１取付金具１０が加硫成形手段により固着され、下端外周部に第２取付金具１２の上端部が加硫成形手段により固着されている。図の場合、筒状金具１６の上端部１６ｂがテーパ状に拡径形成されており、該上端部１６ｂに防振基体１４の下部外周が加硫接着されている。第２取付金具１２の内壁面には、防振基体１４から薄膜状に延設された薄膜ゴム部１４ａが設けられている。

【００１８】第２取付金具１２の下部側には、防振基体１４と対向するようにゴム膜よりなるダイヤフラム２２が装着されている。ダイヤフラム２２は、外周部にリング状の補強金具２４を備え、この補強金具２４が筒状金具１６と底金具１８とのかしめ部にかしめ固定されることで第２取付金具１２に取り付けられている。

【００１９】第２取付金具１２の内側には、ダイヤフラム２２と防振基体１４との間に密閉された流体封入室２６が形成されており、この流体封入室２６に流体としての液体が封入されている。流体封入室２６における第２取付金具１２の内周には、外周にオリフィス流路２８を有する円盤状の仕切部材３０が液密に嵌着されている。流体封入室２６は、この仕切部材３０により防振基体側の第１室２６ａとダイヤフラム側の第２室２６ｂとに仕切られており、両室２６ａ、２６ｂがオリフィス流路２８により連通せしめられている。

【００２０】仕切部材３０は、第１室２６ａと第２室２６ｂとを仕切る弁部材としての円板状のゴム膜３２と、ゴム膜３２に関して防振基体１４側に配された上側部材３４と、ゴム膜３２に関してダイヤフラム２２側に配された下側部材３６とからなる。

【００２１】上側部材３４は、本実施形態では樹脂（例えばＰＰＡ（ポリフタルアミド））のモールド成形体で

あって、図2に示されるように、ゴム膜32の上面に相對して配されてその上方への変位を制限する中央棚部34aと、オリフィス流路28を形成するための溝38を備える周縁部34bとからなる。周縁部34bは、略円筒状をなして、その外周面に周方向に上下2周にわたって延びる溝38を備える。そして、この溝38と防振基体14の薄膜ゴム部14aとで囲まれた空間がオリフィス流路28とされている。周縁部34bには、また、上側の壁の一部が切り欠かれることでオリフィス流路28と第1室26aとを連通させる開口40が設けられている。

【0022】上側部材34の中央棚部34aは、円筒状の周縁部34bの内部を軸方向中央部において上下に区切るように架け渡されており、従って円板状をなしている。中央棚部34aは格子状に形成されており、この格子によって形成された複数の貫通孔42を備える。中央棚部34aの下面、即ちゴム膜32に対向する側の面には、ゴム膜32を収容するための凹部44が設けられている。凹部44の周囲には、リング状をなす平らな開口端面46が確保されている。

【0023】下側部材36は、本実施形態では金属板のプレス成形体であって、ゴム膜32の下面に相對して配されてその下方への変位を制限する円板状の中央棚部36aと、筒状金具16と底金具18とのかしめ部にてかしめ固定される周縁部36bとからなり、中央棚部36aと周縁部36bとの間に上側部材34の周縁部34bとともにオリフィス流路28を形成する中段部36cが形成されている。下側部材36は、周縁部36bがかしめ固定されることにより、上側部材34の周縁部34bの上端面を、防振基体14の下側周縁部に設けられた段差部14bに押圧するようになっている。

【0024】下側部材36の中央棚部36aは、中段部36cから上方に突出して設けられており、上側部材34の中央棚部34aと相對向するように周縁部34bの下部内側に配されている。下側部材36の中央棚部36aは、上側部材34の凹部44の開口部を塞ぐようにその開口端面46に当接する平面部となっており、上側部材34のようにゴム膜32を収容するための凹部を持たない。そのため、上記かしめ固定で下側部材36の中央棚部36aを上側部材34の凹部44の開口端面46に押圧することによって、図2(c)に示すように、上側部材34と下側部材36との間にはゴム膜32の変位を制限する隙間48が形成され、この隙間48の寸法Xは凹部44の深さのみにより規定されている。

【0025】なお、下側部材の中央棚部36aは、上側部材34の中央棚部34aと同様の格子状に形成されており、この格子によって形成された複数の貫通孔50を備える。また、下側部材36の中段部36cには、オリフィス流路28と第2室26bとを連通させる開口52が設けられている。

【0026】ゴム膜32は、上記隙間48に配されて、上下の中央棚部34a、36a間で上下方向の変位が制限されている。隙間48の寸法Xは、ゴム膜32の厚みよりも若干大きく設定されており、これによりゴム膜32の上下動変位を可能にしている。

【0027】ゴム膜32の表面には、上下の中央棚部34a、36aの対向する面に当接して各貫通孔42、50の外周を全周にわたって取り囲む凸条54が一体に突出形成されており、これにより、特に周波数の低い大振幅の振動下において隣接する貫通孔42、50間での流体の漏れを防止している。

【0028】以上よりなる本実施形態の防振装置では、ゴム膜32を収容する隙間48の寸法Xが上側部材34に設けた凹部44の深さのみで規定されている。そのため、下側部材36については金属で形成してかしめ強度に耐える剛性を確保することができ、上側部材34については樹脂で形成して切削加工することなく可動隙間の寸法精度を確保することができる。

【0029】上記防振装置では、ゴム膜32の可動隙間寸法を上側部材34の凹部44の深さのみで規定するために、上側部材34と下側部材36は、凹部44の開口端面46と中央棚部36aの周縁部との突き当て部のみで当接し、その他の部位では両者が接触しないように構成している。この場合、上側部材34と下側部材36との位置決めは、径方向においては筒状金具16の内周面によりなされ、高さ方向においては防振基体14の段差部14bとかしめ部との間でなされる。

【0030】そして、回転方向については、図3に示すように、上側部材34の周縁部34bにおける縦壁56の下端を延長することで位置決めを行うことができる。縦壁56は、オリフィス流路28の下端部において周方向への流れを遮断することで、下側部材36の開口52に液体を導くための壁である。この縦壁56の下端を周縁部34bの下面よりも下方に延長し、この延長部58を下側部材36の開口52に挿入し、一方の開口縁部に突き当てることにより、上側部材34と下側部材36とを回転方向において位置決めするとともに、開口52の開口面積を確保することができる。

【0031】また、上側部材34と下側部材36を凹部44の開口端面46と中央棚部36aの周縁部との突き当て部のみで当接させたことから、図2(b)に示すように、上側部材34の周縁部34bの下端と下側部材36の中段部36cとの間には隙間が確保されている。この隙間によりオリフィス流路28を流れる液体が縦壁56によって完全に遮断されることなくリークすることが想定されるが、上記のように縦壁56の下端を延長したことにより、このようなリークを防止することができる。

【0032】また、図3(c)に示すように、縦壁56の延長部58にフック60を設けて、このフック60を

下側部材36の開口52の開口縁部に引っ掛けてもよく、これにより、回転防止とともに、製造時における上側部材34と下側部材36の脱落を防止することができる。

【0033】図4は、他の実施形態に係る防振装置の断面図である。この実施形態では、上側部材34については上記実施形態と同様に樹脂を採用しているが、下側部材36についてはプレス鋼板に代えてアルミ鋳造品を採用している。

【0034】また、この実施形態では、上側部材34だけでなく、下側部材36の周縁部にもオリフィス流路28を形成するための溝38bを設けている。詳細には、図4、5に示すように、上側部材34は、上記中央棚部34aと、上下2周のオリフィス流路28のうち上側の流路28aを形成するための溝38aを備える周縁部34bとからなる。一方、下側部材36は、上記中央棚部36aと、下側の流路28bを形成するための溝38bを備える周縁部36bとからなり、断面略コの字形をなす周縁部36bの上側の壁が上側部材34の周縁部34bとともに上側の流路28aを形成し、下側の壁が外方に延設されて第2取付金具12のかしめ部でかしめ固定されるようになっている。

【0035】この実施形態でも、上側部材34の中央棚部36aに凹部44が設けられ、下側部材36の平坦な中央棚部36aでこの凹部44の開口部を塞ぐように突き当てることで、上側部材34と下側部材36との間にゴム膜32の変位を制限する隙間48が形成され、この隙間48の寸法Xが凹部44の深さのみにより規定されるようになっている。

【0036】また、この場合、上側部材34と下側部材36との回転方向での位置決めとして、図5に示すように、上側部材34に設けた縦壁62の下端を延長している。この縦壁62は、上側の流路28aから下側の流路28bに液体を導くために設けられた壁であり、この縦壁62の下端を延長し、延長部64を下側部材36の周縁部36bに設けた位置決め用開口66に挿入することで、上側部材34と下側部材36とを回転方向において位置決めしている。また、これにより、縦壁62と下側部材36の周縁部36bとの隙間での液体のリークを防止している。

【0037】この実施形態では、上記した図1に示す実施形態の効果に加えて、上側部材34と下側部材36とともに型成品としたので設計自由度が高いという効果が得られる。

【0038】

【発明の効果】本発明の流体封入式防振装置であると、弾性膜の変位を規制する寸法を第1部材と第2部材のいずれか一方側のみで設定することができるため、弾性膜の可動隙間の寸法精度を向上することができる。

【図面の簡単な説明】

【図1】本発明の1実施形態に係る防振装置の縦断面図である。

【図2】(a)は同実施形態における仕切部材を分解して示す断面図、(b)はその組合せ状態での断面図、(c)は(b)のA部拡大図である。

【図3】(a)は同実施形態における上側部材の側面図、(b)は仕切部材の側面図、(c)は(b)のB部拡大図である。

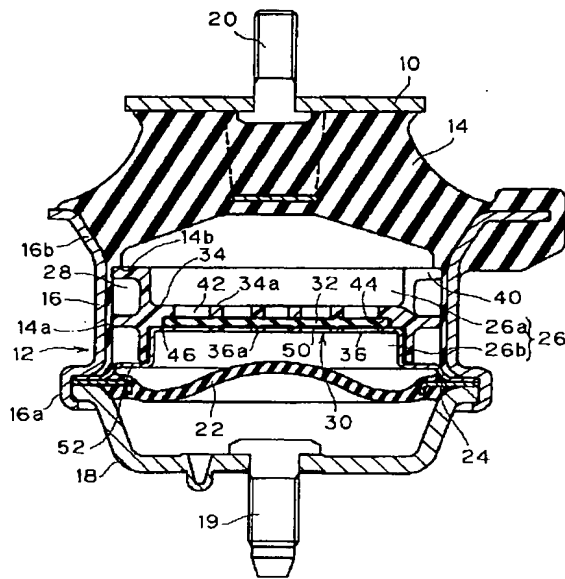
【図4】他の実施形態に係る防振装置の断面図である。

【図5】(a)は他の実施形態に係る仕切部材を分解して示す側面図、(b)その組付け状態での側面図である。

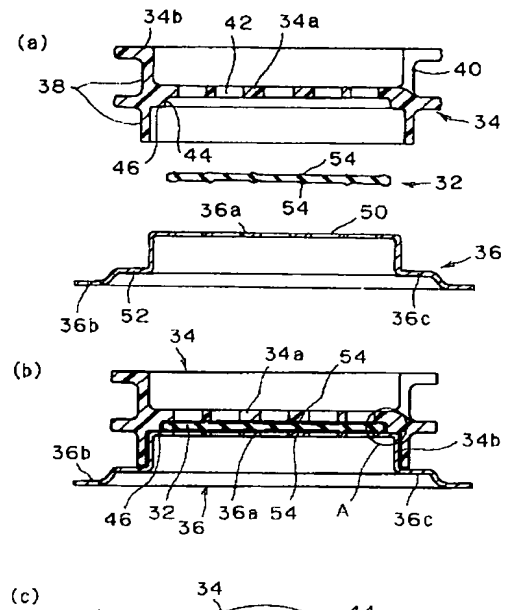
【符号の説明】

- 10……第1取付金具
- 12……第2取付金具
- 14……防振基体
- 22……ダイヤフラム
- 26……流体封入室
- 28……オリフィス
- 30……仕切部材
- 32……ゴム膜
- 34……上側部材
- 36……下側部材
- 36a……中央棚部
- 44……凹部
- 48……開口端面
- 48……縦壁
- 58, 64……延長部
- 52, 66……開口
- 60……フック

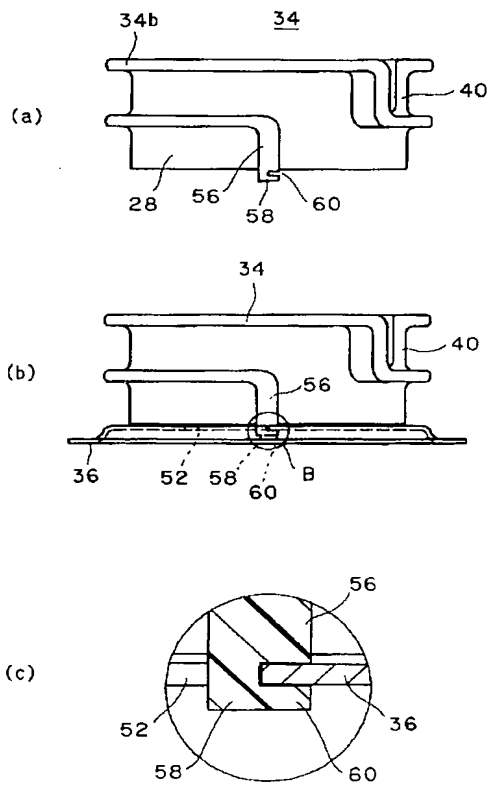
【図1】



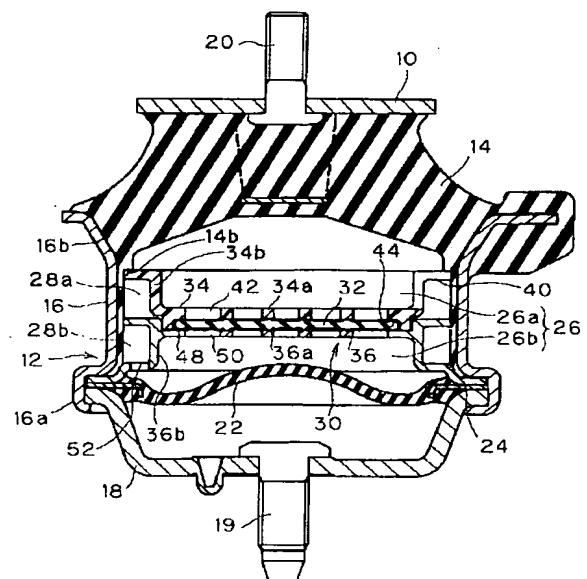
【図2】



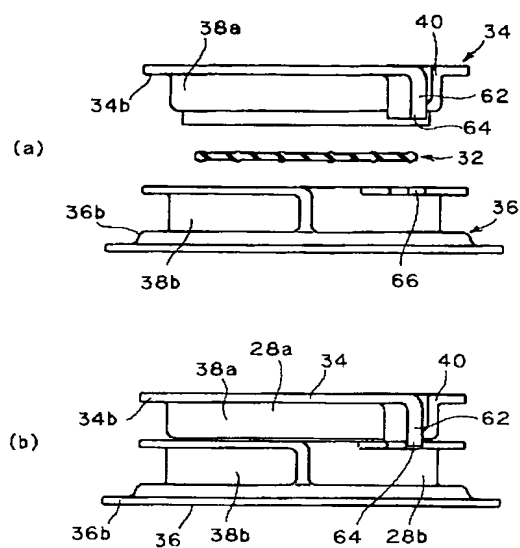
【図3】



【図4】



【図5】



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